

CLAIMS:

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1. A patient support comprising
a support surface,
a base, and
a lift assembly positioned to support the support surface above the base, the lift assembly including an actuator configured to adjust the height of the support surface, the actuator including a housing formed to include first and second cylinders, a first piston positioned in the first cylinder, and a second piston positioned in the second cylinder, the first piston including a first piston head and a first piston rod coupled to the first piston head, the first piston rod being formed to include a first fluid passage therein, the second piston including a second piston head and a second piston rod coupled to the second piston head, the second piston rod being formed to include a second fluid passage therein.

10 2. The patient support of claim 1, wherein the first piston is inverted relative to
the second piston.

15 3. The patient support of claim 1, wherein the first piston acts in series with the
second piston.

20 4. The patient support of claim 1, wherein the first cylinder has a first end and a
second end, the second cylinder has a first end and a second end, the first ends of the first and
second cylinders are fluidly coupled, and the second ends of the first and second cylinders are
fluidly coupled.

5. The patient support of claim 4, wherein a pressure increase in the second ends
of the first and second cylinders extends the actuator.

25 6. The patient support of claim 4, wherein a pressure increase in the first ends of
the first and second cylinders retracts the actuator.

7. The patient support of claim 1, wherein the first piston head has a first side and a second side, the second piston head has a first side and a second side, the first fluid passage is configured to be fluidly coupled to the first cylinder on the second side of the first piston head, and the second fluid passage is configured to be fluidly coupled to the second cylinder on the first side of the second piston head.

8. The patient support of claim 7, wherein the first piston rod is connected to the second side of the first piston head and the second piston rod is connected to the second side of the second piston head.

9. The patient support of claim 1, wherein the lift assembly further includes a plurality of telescoping support tubes defining an interior region and the actuator is positioned in the interior region.

10 15 10. The patient support of claim 9, wherein the lift assembly further includes a plurality of shock absorbers coupled to the plurality of telescoping tubes, each shock absorber includes a body and a pair of arms coupled to the body such that extension of the lift assembly causes contact between arms of the shock absorbers coupled to adjacent telescoping tubes.

11. The patient support of claim 1, further comprising a fluid system coupled to the first and second pistons to supply pressurized fluid to the housing.

12. A patient support comprising

20 a base,
a support surface, and
a lift assembly including a plurality of telescoping support tubes defining an interior region, and an actuator located in the interior region of the plurality of telescoping support tubes, the actuator including a plurality of pistons having fluid lines positioned therein.

25 13. The patient support of claim 12, wherein the plurality of pistons includes first and second pistons and the first piston is inverted relative to the second piston.

14. The patient support of claim 12, wherein the plurality of pistons includes first and second pistons and the first piston acts in series with the second piston.

15. The patient support of claim 12, wherein the actuator includes a first cylinder and a second cylinder, the first cylinder has a first end and a second end, the second cylinder has a first end and a second end, the first ends of the first and second cylinders are fluidly coupled, and the second ends of the first and second cylinders are fluidly coupled.

5 16. The patient support of claim 15, wherein a pressure increase in the second ends of the first and second cylinders extends the actuator.

17. The patient support of claim 15, wherein a pressure increase in the first ends of the first and second cylinders retracts the actuator.

18. The patient support of claim 12, wherein the plurality of pistons includes a first piston and a second piston, the first piston includes a first piston head and a first piston rod, the second piston includes a second piston head and a second piston rod, the first piston head has a first side and a second side, the second piston head has a first side and a second side, the fluid passage in the first piston extends within the first piston rod and first piston head, and the fluid passage in the second piston extends within the second piston rod and stops short of the second piston head.

15 19. The patient support of claim 12, the lift assembly including shock absorbers coupled to each of the plurality of telescoping support tubes.

20 20. The patient support of claim 19, wherein each shock absorber includes a body and a pair of arms coupled to the body such that extension of the actuator causes contact between arms of the shock absorbers coupled to different telescoping support tubes.

21. The patient support of claim 12, further comprising a fluid system coupled to the first and second pistons to supply pressurized fluid to the housing.

22. A patient support comprising

a base,

25 a support surface, and

a lift assembly including a plurality of telescoping support tubes and an actuator positioned in the plurality of telescoping support tubes, the support tubes and the actuator defining an interior region therebetween, and the interior region being devoid of fluid lines.

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23. The patient support of claim 22, wherein the actuator includes a housing formed to include first and second cylinders, a first piston positioned in the first cylinder and a second piston positioned in the second cylinder, the first piston includes a first piston head and a first piston rod coupled to the first piston head, the first piston rod includes a first fluid passage therein, and the second piston includes a second piston head and a second piston rod coupled to the second piston head, the second piston rod being formed to include a second fluid passage therein.

24. The patient support of claim 23, wherein the first piston is inverted relative to the second piston.

10 25. The patient support of claim 23, wherein the first piston acts in series with the second piston.

15 26. The patient support of claim 23, wherein the first cylinder has a first end and a second end, the second cylinder has a first end and a second end, the first ends of the first and second cylinders are fluidly coupled, and the second ends of the first and second cylinders are fluidly coupled.

27. The patient support of claim 26, wherein a pressure increase in the second ends of the first and second cylinders extends the actuator.

28. The patient support of claim 26, wherein a pressure increase in the first ends of the first and second cylinders retracts the actuator.

20 29. The patient support of claim 26, wherein the first piston head has a first side and a second side, the second piston head has a first side and a second side, the first fluid passage is fluidly coupled to the first cylinder on the second side of the first piston head, and the second fluid passage is fluidly coupled to the second cylinder on the first side of the second piston head.

25 30. The patient support of claim 23, wherein the lift assembly further includes a plurality of shock absorbers coupled to each telescoping tube.

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31. The patient support of claim 30, wherein each shock absorber includes a body and a pair of arms coupled to the body such that extension of the lift assembly causes contact between shock absorbers of adjacent telescoping tubes, and the contact is performed by the arms of the absorbers.

5 32. The patient support of claim 23, further comprising a fluid system coupled to the first and second pistons to supply pressurized fluid to the housing.

10 33. A patient support comprising
a support surface,
a base,

15 a lift assembly positioned between the support surface and the base to raise and lower the support surface relative to the base, and

a plurality of telescoping support tubes, the support tubes including
telescoping support members and shock absorbers configured to dampen impact between the
telescoping support members.

20 34. The patient support of claim 33, wherein each shock absorber includes a body and a pair of arms coupled to the body such that extension of the lift assembly causes contact between the arms of the shock absorbers coupled to adjacent tubes.

25 35. The patient support of claim 34, wherein the arms of the shock absorbers are flexible.

36. The patient support of claim 33, wherein relative movement between a first telescoping tube and a second telescoping tube causes a first shock absorber coupled to the first telescoping tube to contact a second shock absorber coupled to the second telescoping tube.

37. The patient support of claim 36, wherein extension of the lift assembly raises the first telescoping tube and causes the first shock absorber to contact the second shock absorber.

38. The patient support of claim 37, wherein further extension of the lift assembly raises the second telescoping tube.

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39. The patient support of claim 33, wherein the shock absorbers are positioned in spaces between adjacent telescoping support tubes.

40. The patient support of claim 33, wherein the shock absorbers are coupled to one of the telescoping tubes so as to be positioned between the ends of the telescoping tube to 5 which it is attached.

41. The patient support of claim 33, further comprising contact pads positioned to in space between adjacent telescoping support tubes.

42. The patient support of claim 41, wherein the contact pads are positioned in space between adjacent telescoping support tubes with the shock absorbers.

10 43. The patient support of claim 33, further comprising a fluid system coupled to the first and second pistons to supply pressurized fluid to the housing.

44. An actuator comprising
a housing formed to include first and second cylinders,

a first piston positioned in the first cylinder, the first piston including a first piston head and a first piston rod coupled to the first piston head, the first piston rod being formed to include a first fluid passage therein, and

a second piston positioned in the second cylinder, the second piston including a second piston head and a second piston rod coupled to the second piston head, the second piston rod being formed to include a second fluid passage therein.

20 45. The actuator of claim 44, wherein the first piston is inverted relative to the second piston.

46. The actuator of claim 44, wherein the first piston acts in series with the second piston.

25 47. The actuator of claim 44, wherein the first cylinder has a first end and a second end, the second cylinder has a first end and a second end, the first ends of the first and second cylinders are fluidly coupled, and the second ends of the first and second cylinders are fluidly coupled.

48. The actuator of claim 47, wherein a pressure increase in the second ends of the first and second cylinders extends the actuator.

49. The actuator of claim 47, wherein a pressure increase in the first ends of the first and second cylinders retracts the actuator.

50. The actuator of claim 47, wherein the first piston head has a first side and a second side, the second piston head has a first side and a second side, the first fluid passage is configured to be fluidly coupled to the first cylinder on the second side of the first piston head, and the second fluid passage is configured to be fluidly coupled to the second cylinder on the first side of the second piston head.

10 51. The actuator of claim 47, wherein the first piston rod is coupled to the second side of the first piston head and the second piston rod is coupled to the second side of the second piston head.

52. The actuator of claim 44, further comprising a fluid system coupled to the first and second pistons to supply pressurized fluid to the housing.

15 53. An actuator comprising
a housing,
a first piston positioned in the housing,
a second piston positioned in the housing, and
a fluid system coupled to the first and second pistons to supply pressurized fluid to the housing.

20 54. The actuator of claim 53, wherein the first piston includes a first piston head and a first piston rod coupled to the piston head, the first piston rod includes a first fluid passage therein in fluid communication with the fluid system, the second piston includes a second piston head and a second piston rod coupled to the piston head, and the second piston rod includes a second fluid passage therein in fluid communication with the fluid system.

25 55. The actuator of claim 55, wherein the first piston head cooperates with the housing to define a first cavity and a second cavity, the first piston head is positioned between the first and second cavities, the second piston head cooperates with the housing to define a third cavity and a fourth cavity, and the second piston head is positioned between the third and fourth cavities.

56. The actuator of claim 55, wherein the first cavity is fluidly coupled to the third cavity and the second cavity is fluidly coupled to the fourth cavity.

57. The actuator of claim 55, wherein a pressure increase in the first and third cavities extends the actuator.

5 58. The actuator of claim 55, wherein a pressure increase in the second and fourth cavities retracts the actuator.

6 59. The actuator of claim 55, wherein the first fluid passage is in fluid communication with the first cavity.

10 60. The actuator of claim 55, wherein the second fluid passage is in fluid communication with the fourth cavity.

61. The actuator of claim 53, wherein the first piston acts in series with the second piston to extend and retract the actuator.

15 62. An actuator comprising
a housing,
a first piston positioned in the housing,
a second piston positioned in the housing, and
means for providing pressurized fluid to the housing, the pressurized fluid providing means including fluid passages in the pistons.

63. The actuator of claim 62, wherein each piston includes a piston head and a piston rod coupled to the piston head, the fluid passage in the first piston extends in the piston rod and head of the first piston, and the fluid passage in the second piston extends in the piston rod of the second piston and stops short of the piston head of the second piston.

20 64. The actuator of claim 62, wherein the first piston acts in series with the second piston.

25 65. The actuator of claim 64, wherein the first piston includes a first piston head and a first piston rod coupled to the first piston head, the first piston rod includes a first fluid passage therein, the second piston includes a second piston head and a second piston rod coupled to the second piston head, and the second piston rod includes a second fluid passage therein.

66. The actuator of claim 65, wherein the first piston head cooperates with the housing to define a first cavity and a second cavity and the second piston head cooperates with the housing to define a third cavity and a fourth cavity.

67. The actuator of claim 66, wherein the first cavity is fluidly coupled to the third cavity and the second cavity is fluidly coupled to the fourth cavity.

68. The actuator of claim 66, wherein a pressure increase in the first and third cavities extends the actuator.

69. The actuator of claim 66, wherein a pressure increase in the second and fourth cavities retracts the actuator.

70. The actuator of claim 66, wherein the first fluid passage is in fluid communication with the first cavity.

71. The actuator of claim 66, wherein the second fluid passage is in fluid communication with the fourth cavity.

72. An actuator comprising
a housing,
a first piston positioned in the housing,
a second piston positioned in the housing,
a first fluid passage positioned in the first piston,
a second fluid passage positioned in the second piston, and
a fluid system coupled to the first and second passages to provide pressurized fluid thereto to retract and extend the first and second pistons.

73. The actuator of claim 72, wherein the first piston is inverted relative to the second piston.

74. The actuator of claim 72, wherein the first piston acts in series with the second piston.

75. The actuator of claim 72, wherein the first piston includes a first piston head and a first piston rod coupled to the first piston head, the first piston rod includes the first fluid passage therein, and the second piston includes a second piston head and a second piston rod coupled to the second piston head, the second piston rod includes the second fluid passage therein.

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76. The actuator of claim 75, wherein the first piston head cooperates with the housing to define a first cavity and a second cavity and the second piston head cooperates with the housing to define a third cavity and a fourth cavity.

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77. The actuator of claim 76, wherein the first cavity is fluidly coupled to the third cavity and the second cavity is fluidly coupled to the fourth cavity.

78. The actuator of claim 76, wherein a pressure increase in the first and third cavities extends the actuator.

79. The actuator of claim 76, wherein a pressure increase in the second and fourth cavities retracts the actuator.

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80. The actuator of claim 76, wherein the first fluid passage is fluidly coupled to the first cavity and the second fluid passage is fluidly coupled to the fourth cavity.